CLAIMS

1. A method of determining filter coefficients for filter stages in a multirate digital filter device to achieve a desired filter response, the method comprising the steps of:

(a) determining a first plurality of evenly spaced sample points representing the desired response function on a logarithmic time scale, such that the sample points of the first plurality have an increasing spacing when viewed in a linear time scale, and

(b) determining filter coefficients for each filter stage from an associated group of sample points out of the first plurality of sample points.

2. A method as claimed in claim 1, further comprising, prior to step (a):

determining a second plurality of sample points representing the desired response function on a logarithmic frequency scale, and deriving the sample points of the first plurality representing the desired response function in the logarithmic time scale from the sample points of the second plurality.

3. A method as claimed in claim 2, wherein the step of deriving the sample points of the first plurality from the sample points of the second plurality is further based on a desired phase response of the multirate digital filter device.

4. A method as claimed in claim 2, wherein the step of deriving the sample points of the first plurality from the sample points of the second plurality comprises deconvoluting the desired response function in the logarithmic frequency scale using a set of prototype filter response functions, and deriving the first plurality of sample points representing the desired response function in the logarithmic time scale from a summation of corresponding prototype filter response functions.

5. A method as claimed in claim 1, wherein the filter coefficients for each filter stage are determined such that a last tap in one stage is equal to a first tap in the next lower rate filter stage.

6. A method as claimed in claim 1, wherein step (b) comprises, for each associated group of sample points out of the first plurality of sample points, applying a transform matrix to determine the filter coefficients of the associated filter stage.

7. A method as claimed in claim 6, wherein for at least some of the associated groups of sample points the same transformation matrix is applied to determine the filter coefficients of the respective associated filter stages.

8. A method as claimed in claim 6, wherein the transformation matrices are based on a substantially inverse filter response characteristic analysis of the individual filter taps of the respective filter stages.

9. A multirate digital filter device comprising:

a plurality of filter stages,

an interface unit for inputting a desired filter response of the digital filter device, and

a processor unit for determining filter coefficients for the filter stages to achieve the desired filter response,

wherein the processor unit is arranged, in use, such that a response function representing the input desired filter response on a logarithmic frequency scale is transformed into a logarithmic time scale, a first plurality of sample points representing the response function in the logarithmic time scale is determined, such that the sample points of the first plurality have an increasing pitch when viewed in a linear time scale, and the filter coefficients for each filter stage are determined from an associated group of sample points out of the first plurality of sample points.

10. A device as claimed in claim 9, wherein the processor unit is further arranged, in use, to determine a second plurality of sample points representing the desired response function on a logarithmic frequency scale, and to derive the sample points of the first plurality representing the desired response function in the logarithmic time scale from the sample points of the second plurality.

11. A device as claimed in claim 10, wherein the processor unit is further arranged such that, in use, the deriving the sample points of the first plurality from the sample points of the second plurality is further based on a desired phase response of the multirate digital filter device.

12. A device as claimed in claim 10, wherein the processor unit is arranged such that, in use, the deriving the sample points of the first plurality from the sample points of the second plurality comprises deconvoluting the desired response function in the logarithmic frequency scale using a set of prototype filter response functions, and to derive the first plurality of sample points representing the desired response function in the logarithmic time scale from a summation of corresponding prototype filter response functions.

13. A device as claimed in claim 9, wherein the device is arranged, such that, in use, filter coefficients for each filter stage are determined such that a last tap in one stage is equal to a first tap in the next lower rate filter stage.

14. A device as claimed in claim 9, wherein the processor unit is arranged such that, in use, the determining of the filter coefficients for each filter stage from an associated group of sample points out of the first plurality of sample points comprises, for each associated group of sample points out of the first plurality of sample points, applying a transform matrix to determine the filter coefficients of the associated filter stage.

15. A device as claimed in claim 14, wherein the processor unit is arranged such that, in use, for at least some of the associated groups of sample points the same transformation matrix is applied to determine the filter coefficients of the respective associated filter stages.

16. A device as claimed in claim 14, wherein the processor unit is arranged, in use, to base the transformation matrices on a substantially inverse filter response characteristic analysis of the individual filter taps of the respective filter stages.

17. A data storage medium having stored thereon computer readable data for instructing a computer to execute a method of determining filter coefficients for filter stages in a multirate digital filter device to achieve a desired filter response, the method comprising the steps of:

(a) determining a first plurality of evenly spaced sample points representing the desired response function on a logarithmic time scale, such that the sample points of the first plurality have an increasing spacing when viewed in a linear time scale, and

(b) determining filter coefficients for each filter stage from an associated group of sample points out of the first plurality of sample points.